

What is claimed is:

- 1) A circuit, comprising:
 - (a) a first node for providing a variable first voltage;
 - (b) a second node for providing a variable second voltage;
 - (c) a first transistor, coupled to the first node, having a first gate for providing a first current responsive to a first control voltage being applied to the first gate;
 - (d) a second transistor, coupled to the second node, having a second gate for providing a second current responsive to a second control voltage being applied to the second gate;
 - (e) a first control circuit, coupled to the first gate and the second node, for providing the first control voltage responsive to the variable second voltage; and,
 - (f) a second control circuit, coupled to the second gate and the first node, for providing the second control voltage responsive to the variable first voltage.
- 2) The circuit of claim 1, wherein the first voltage is different from the second voltage.
- 3) The circuit of claim 1, wherein the first and second transistors operate in a saturation region.
- 4) The circuit of claim 1, wherein the circuit further comprises:
 - (g) a third transistor, coupled to the first node, having a third gate coupled to the first node, for providing a third current responsive to the first variable voltage; and,
 - (h) a fourth transistor, coupled to the second node, having a fourth gate coupled to the second node, for

providing a fourth current responsive to the second variable voltage.

- 5 5) The circuit of claim 4, wherein the first current approximately equals the fourth current and the third current approximately equals the second current.
- 10 6) The circuit of claim 1, wherein the first variable voltage and the second variable voltages are obtained from a clock signal.
- 15 7) The circuit of claim 6, wherein the clock signal has an amplitude of greater than approximately 400 mv.
- 20 8) The circuit of claim 4, wherein the first current, the second current, the third current and the fourth current are used to provide a duty cycle correction signal.
- 25 9) The circuit of claim 4, wherein the first transistor, the second transistor, the third transistor and the fourth transistor are n-type transistors.
- 30 10) The circuit of claim 4, wherein the first control circuit comprises:
 (i) a voltage source;
 (j) a fifth transistor, coupled to the voltage source, having a gate;
 (k) a sixth transistor, coupled to the fifth transistor, having a gate coupled to the first transistor gate;

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- (l) a sixth transistor, coupled to the voltage source, having a gate; and,
- (m) a seventh transistor, coupled to the sixth transistor, having a gate coupled to the second node.

11) The circuit of claim 10, wherein the second control circuit comprises:

- (n) an eighth transistor coupled to the voltage source;
- (o) a ninth transistor, coupled to the eighth transistor, having a gate coupled to the first node;
- (p) a tenth transistor coupled to the voltage source; and,
- (q) an eleventh transistor coupled to the tenth transistor, having a gate coupled to the second transistor gate.

12) The circuit of claim 1, wherein the circuit is a cross-coupled load with a built-in current mirrors circuit used in a double data rate receiving circuit for improving a clock signal.

13) The circuit of claim 1, wherein the circuit is in a memory device.

14) The circuit of claim 1, wherein the circuit is in a memory device controller.

15) A circuit for correcting a duty cycle of a clock signal, comprising:

- (a) a first node for providing a variable first voltage representing the clock signal;
- (b) a second node for providing a variable second voltage representing the clock signal;

- 18) The circuit of claim 17, wherein the first current, the second current, the third current and the fourth current are used to provide a duty cycle correction signal.
- 5 19) The circuit of claim 16, wherein the first control circuit comprises:
- (i) a voltage source;
 - (j) a fifth transistor, coupled to the voltage source, having a gate;
 - (k) a sixth transistor, coupled to the fifth transistor, having a gate coupled to the first transistor gate;
 - 10 (l) a sixth transistor, coupled to the voltage source, having a gate; and,
 - (m) a seventh transistor, coupled to the sixth transistor, having a gate coupled to the second node.
- 15 20) The circuit of claim 19, wherein the second control circuit comprises:
- (n) an eighth transistor coupled to the voltage source;
 - (o) a ninth transistor, coupled to the eighth transistor, having a gate coupled to the first node;
 - (p) a tenth transistor coupled to the voltage source; and,
 - (q) an eleventh transistor coupled to the tenth transistor, having a gate coupled to the second transistor gate.
- 25 21) An apparatus, comprising:
 - (a) a transmit circuit for transmitting serial data; and,
 - (b) a receive circuit, coupled to the transmit circuit, for generating an output signal responsive to the serial data, wherein the receive circuit includes:
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- (i) a first node for providing a variable first voltage;
- (ii) a second node for providing a variable second voltage;
- (iii) a first transistor, coupled to the first node, having a first gate for providing a first current responsive to a first control voltage being applied to the first gate;
- 10 (iv) a second transistor, coupled to the second node, having a second gate for providing a second current responsive to a second control voltage being applied to the second gate;
- (v) a first control circuit, coupled to the first gate and the second node, for providing the first control voltage responsive to the variable second voltage; and,
- 15 (vi) a second control circuit, coupled to the second gate and the first node, for providing the second control voltage responsive to the variable first voltage.
- 20 22) The circuit of claim 21, wherein the receiving circuit further comprises:
- (vii) a third transistor, coupled to the first node, having a third gate coupled to the first node, for providing a third current responsive to the first variable voltage; and,
- 25 (viii) a fourth transistor, coupled to the second node, having a fourth gate coupled to the second node, for providing a fourth current responsive to the second variable voltage.

- 23) The circuit of claim 22, wherein the first current approximately equals the fourth current and the third current approximately equals the second current.
- 5 24) The circuit of claim 22, wherein the first control circuit comprises:
- (ix) a voltage source;
 - (x) a fifth transistor, coupled to the voltage source, having a gate;
 - (xi) a sixth transistor, coupled to the fifth transistor, having a gate coupled to the first transistor gate;
 - 10 (xii) a sixth transistor, coupled to the voltage source, having a gate; and,
 - (xiii) a seventh transistor, coupled to the sixth transistor, having a gate coupled to the second node.
- 15 25) The circuit of claim 24, wherein the second control circuit comprises:
- (xiv) an eighth transistor coupled to the voltage source;
 - (xv) a ninth transistor, coupled to the eighth transistor, having a gate coupled to the first node;
 - 20 transistor;
 - (xvi) a tenth transistor coupled to the voltage source ;and,
 - (xvii) an eleventh transistor coupled to the tenth transistor, having a gate coupled to the second transistor gate.
- 25 26) The apparatus of claim 21, wherein the transmit circuit is included in a memory controller and the receive circuit is included in a memory device.
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- 27) The apparatus of claim 21, wherein the receive circuit is a circuit used for improving a clock signal.
- 5 28) A method, comprising the steps of:
- (a) obtaining a clock signal;
- (b) applying a first voltage from the clock signal to a first transistor operating in a saturation region;
- (c) applying a second voltage from the clock signal to a second transistor operating in a saturation region;
- 10 (d) providing a first current responsive to applying the first voltage to the first transistor; and,
- (e) providing a second current responsive to applying the second voltage to the second transistor.
- 15 29) The method of claim 28, further comprising the steps of:
- (f) applying the first voltage to a third transistor operating in a saturation region;
- (g) applying the second voltage to a fourth transistor operating in a saturation region;
- 20 (h) providing a third current responsive to applying the first voltage to the third transistor;
- (i) providing a fourth current responsive to applying the second voltage to the fourth transistor.
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- 30 30) The method of claim 29, wherein the first current approximately equals the fourth current and the third current approximately equals the second current.

- 31) The method of claim 28, wherein the first current, the second current, the third current and fourth current are used to provide a duty cycle correction signal.

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